

Terrestrial Resources

The nation's rural areas are environmentally significant in a number of ways. They are storehouses of biological resources, water resources, soil resources, and wildlife habitat. They provide a great many environmental services, and—in the form of farmland, grazing land, and forests—they are commercially valuable.

How rural areas are managed has far-reaching impacts on the state of the environment, from air and water pollution to biodiversity and stable ecosystems. Yet all these resources are entrusted to a relatively small share of the nation's population. The total rural population in 1996 was 53.5 million, or about one fifth of the national total. Only about 2 percent of the U.S. population grows much of the nation's food and fiber, with enough excess to export quantities to other countries.

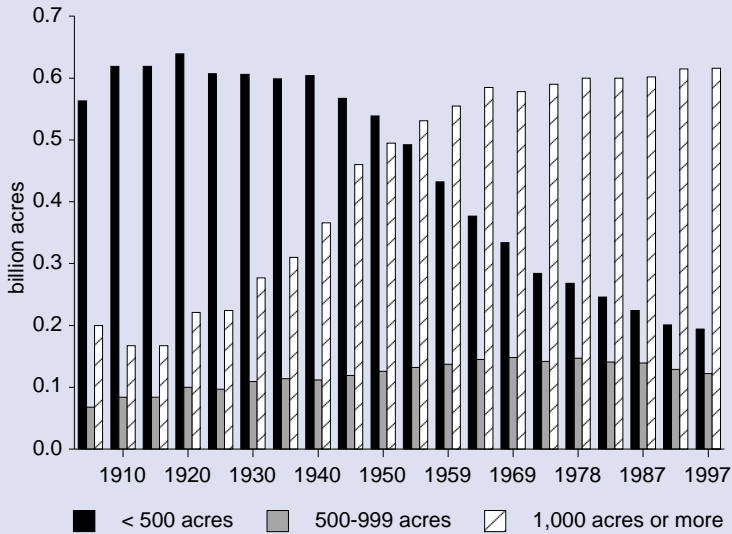
The general trend in U.S. agriculture for the past several decades is to grow more food on less land. The 932 million acres of farmland currently in use is about 20 percent less than the total in 1950. Small and mid-sized farms of less than 500 acres once managed about half the nation's farmland, but they currently manage only about 20 percent of the total. Large farms over 1,000 acres now control about two thirds of the nation's farmland (Figure 7.1).

U.S. agriculture also is increasingly specialized, mechanized, labor-efficient, and capital-intensive. In the past decade, U.S. farm output per unit of input increased by 20 percent. The factors responsible for this growth include use of fertilizers and pesticides, plus improvements in hybrid plant varieties and animal breeding practices.

The most intensively used and most valuable agricultural land is generally that planted to crops and known as cropland. Four out of every five cropland acres produces either corn, wheat, hay, or soybeans in a given year. The percentage of total land used for crops is largest in the Northern Plains and Corn Belt, followed by Lake States, Mountain, and Southern Plains regions (Figure 7.2). Most of the corn and virtually all of the hay is fed to livestock. Corn, wheat, and soybeans also are major export commodities.

In the 1970s, high worldwide demand for U.S. farm commodities, fueled by crop shortages abroad, encouraged a federal farm policy that emphasized increased production. At the same time, an emerging national interest in environmental protection increased concerns about soil erosion from cropland and the environmental impact of fertilizer and pesticide use.

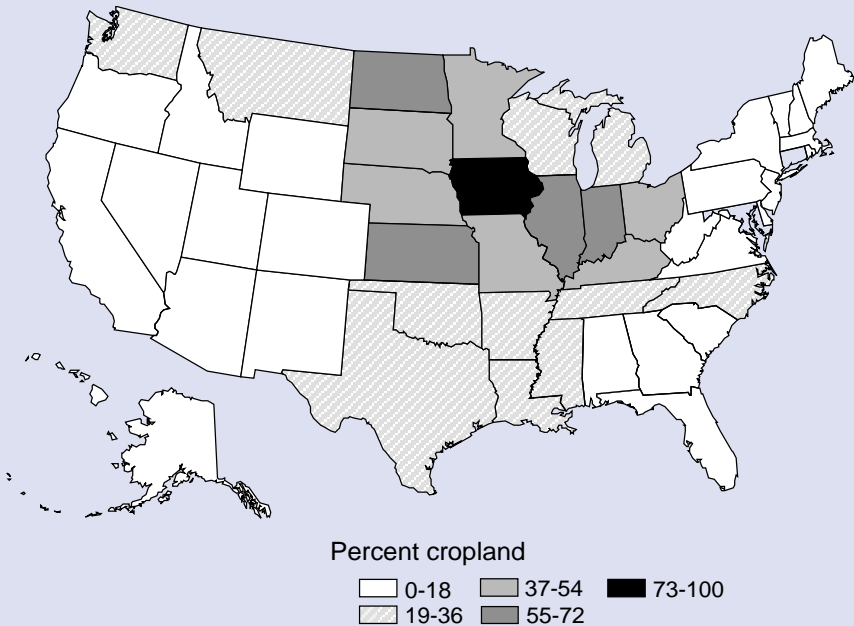
Figure 7.1 Land in U.S. Farms by Farm Size, 1900-1997



Source: See Part III, Table 7.3.

Note: Data are reported for years coinciding with the Census of Agriculture.

Figure 7.2 Proportion of State Land Area in Cropland, 1992



Source: Daugherty, A.B., *Major Uses of Land in the United States, 1992* (USDA, ERS, Washington, DC, 1995).

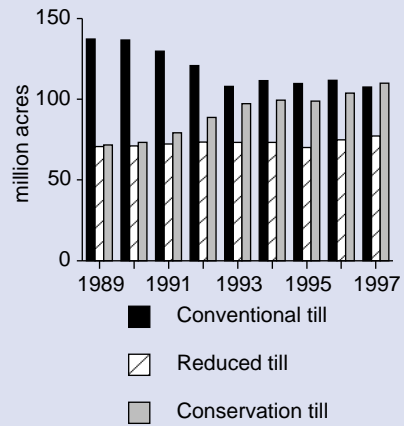
Since that time, a wide variety of federal programs have been developed to encourage better management of soil resources, fertilizers, and pesticides. Conservation tillage practices, which were rarely practiced in the 1970s, are now used on about 37 percent of all planted acres (Figure 7.3). Federal programs encourage farmers not to plow highly erodible lands or convert wetlands to croplands. Practices such as integrated pest management are also more widely used.

Grazing Lands

The nation has about 803 million acres of grazing lands, including 591 million acres of grassland pasture and range, 145 million acres of grazed forestland, and 67 million acres of cropland used for pasture. About 55 percent of grazing lands are privately owned, with the rest on federal lands in 11 western states and Alaska (36 percent), on state and local government land (5 percent), and on land managed by the Bureau of Indian Affairs held in trust for Indian tribes and individuals (4 percent). Most of the nation's grazing land is found west of the Continental Divide (Figure 7.4).

Though the condition of rangeland has improved somewhat in recent years, much of the nation's rangeland is degraded. The Bureau of Land Management, which manages about 169 million acres of land for grazing, estimated in 1997 that fully 50 percent of its grazing lands were in fair or poor condition. On nonfederal rangelands, it is estimated that about 59 percent of rangelands are either in fair or

Figure 7.3 U.S. Cropland Tillage Practices, 1989-1997



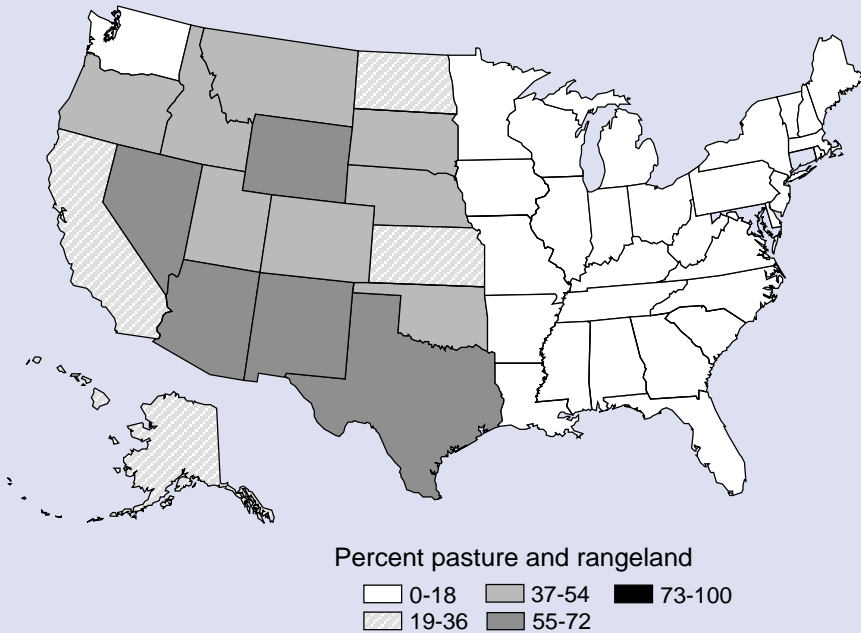
Source: See Part III, Table 7.5.

poor condition. For both BLM and non-federal rangelands, the share of land in poor condition has declined sharply since the 1960s. For nonfederal lands, rangeland in poor condition declined from 40 percent of the total in 1963 to 15 percent in 1992. For BLM lands, rangeland in poor condition dropped from 30 percent to 13 percent over the 1966-97 period.

Forests

During the past 25 years, the United States has maintained a relatively stable area of forestland. Today, forests cover about 732 million acres in the United States. Roughly two thirds of all public and private U.S. forests (490 million acres) are classified as timberland—forests capable of producing 20 cubic feet per acre of industrial wood annually and not reserved from timber harvest. Another 36 million acres that could qualify as timber-

Figure 7.4 Proportion of State Land Area in Pasture and Rangeland, 1992



Source: Daugherty, A.B., *Major Uses of Land in the United States, 1992* (USDA, ERS, Washington, DC, 1995).

land are reserved from harvesting and managed as parks or wilderness.

The Southeast and South Central states have most of this resource, with 199 million acres of public and private timberland (Figure 7.5). The Northeast and Midwest have 157 million acres, followed by the Pacific Coast with 69 million acres (including 15 million acres in Alaska), and the Rocky Mountain states with 62 million acres.

TRENDS

The total land area of the contiguous United States is approximately 1.9 billion

acres, and the three major current uses of this land are grassland pasture and range, forest-use land, and cropland, in that order (Figure 7.6). (Alaska has 365 million acres, with 24 percent of it in forest-use and 75 percent classified as miscellaneous other land, which includes tundra. Hawaii has 4 million acres nearly evenly divided between grassland pasture and range, forest-use land and special use land, which includes parks, wildlife areas, and urban; only 7 percent of Hawaii's land is used for cropland.)

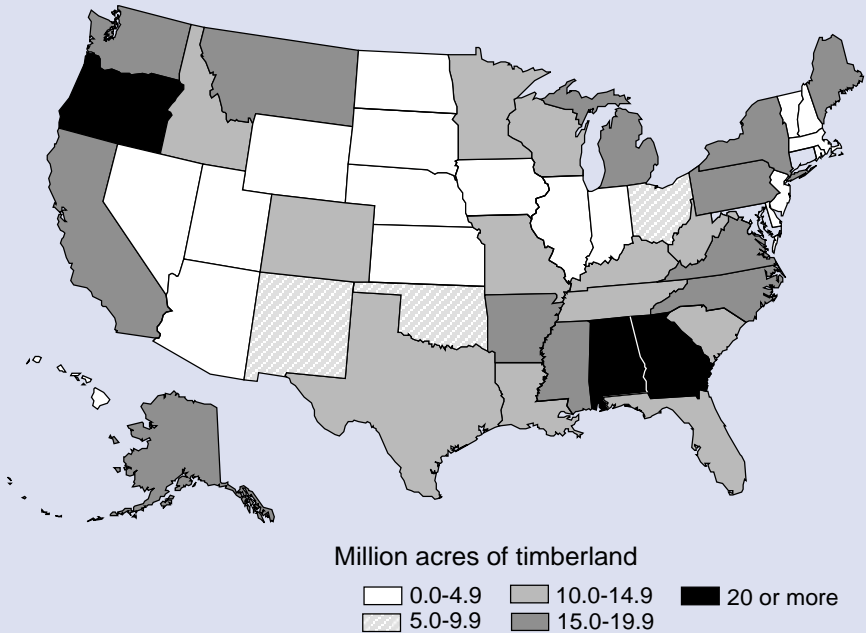
Grassland pasture and range has generally declined throughout this century. Reasons for the decline include conversion of pasture to cropland, improved for-

age quality and productivity of existing grazing lands, and decline in the number of domestic animals, particularly sheep and draft animals. Much of the apparent decline in forest-use land results from the designation of large acreages of forest land as parks, wilderness areas, and wildlife areas, which prohibit forestry uses such as timber production. There was a slight increase in forest-use land from 1987 to 1992, primarily in commercial timberland. The total acreage classified as cropland (cropland used for crops, used for pasture, and idle) has not changed greatly for several decades; however, considerable changes have occurred in component

acreages (as will be discussed later in this chapter). (See Part III, Table 7.1)

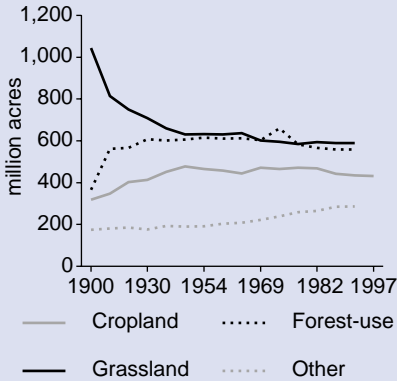
Though a relatively small fraction (3 percent) of all land in the nation, land devoted to urban areas has increased rapidly. In response to an expanding U.S. population, land in urban uses—for homes, schools, office buildings, shopping centers, and other commercial and industrial uses—increased 285 percent from 15.0 million acres in 1945 to 58.9 million acres in 1992 (Figure 7.7). Land converted to urban uses comes from several different major land uses. From 1982 to 1992, 46 percent of new urban land came from cropland and pasture, 15 per-

Figure 7.5 U.S. Timberland Acreage by State, 1992



Source: Powell, D.S., et al., *Forest Resources of the United States, 1992* (USDA, FS, Washington, DC, 1993).

Figure 7.6 Major Uses of Land in the Contiguous United States, 1900-1997

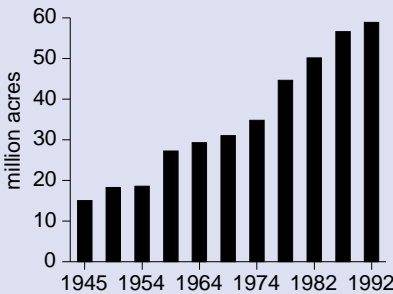


Source: USDA, based on data in Part III, Table 7.1 and Table 7.4.

Note: 1997 data for forest-use, grassland, and other not available.

ment of wilderness areas and national parks in Alaska. Land in transportation uses increased between 1945 and 1982 as the U.S. built more highways, roads, and airports in rural areas; land in this category has since declined, primarily due to the abandonment of railroad facilities and the inclusion of some transportation uses into urban areas. Land in defense and industrial use declined 20 percent from 1945 to 1992, with some conversion to urban use, while miscellaneous farmland declined more than 50 percent, mirroring a trend towards fewer, but larger, more consolidated farms and an increasing tendency for farm families and workers to live off the farm. (See Figure 7.8 and Part III, Table 7.2)

Figure 7.7 U.S. Urban Area, 1945-1992



Source: See Part III, Table 7.2.

Note: Estimates are based on Census data.

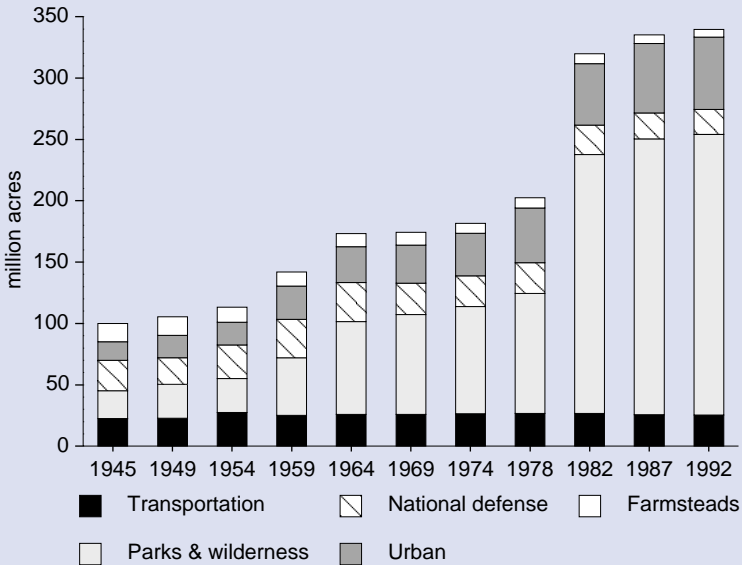
Farmland Trends

Decades-long trends in decreasing farm numbers and increasing farm size continue. (Part III, Table 7.3) Since the turn of the century, the number of farms in the United States has declined by more than 60 percent while the average farm size has nearly tripled. American agriculture is now dominated by large farms of 500 acres or more, which represent an increasing percentage of total farm numbers (Figure 7.9). Meanwhile, the percentages represented by farms of 1-49 acres and 50-499 acres have moved in opposing directions, indicating a shift from the former to the latter in the 1950s and 1960s followed by a reversal in the late 1970s and 1980s. Of the 1.9 million farms in 1997, over half were smaller than 180 acres, while farms of 500 acres or more represented 20 percent of all farms

cent from rangeland, and 38 percent from forestland.

Land use for recreation and wildlife areas also increased nearly 10-fold from 1945 to 1992, mostly from the conversion of federal lands to meet the greater public demand for such areas and the establish-

Figure 7.8 Special Uses of Land in the United States, 1945-1992



Source: See Part III, Table 7.2.

Note: The large increase in park and wilderness land after 1978 was due in part to the Congressional designations, especially in Alaska.

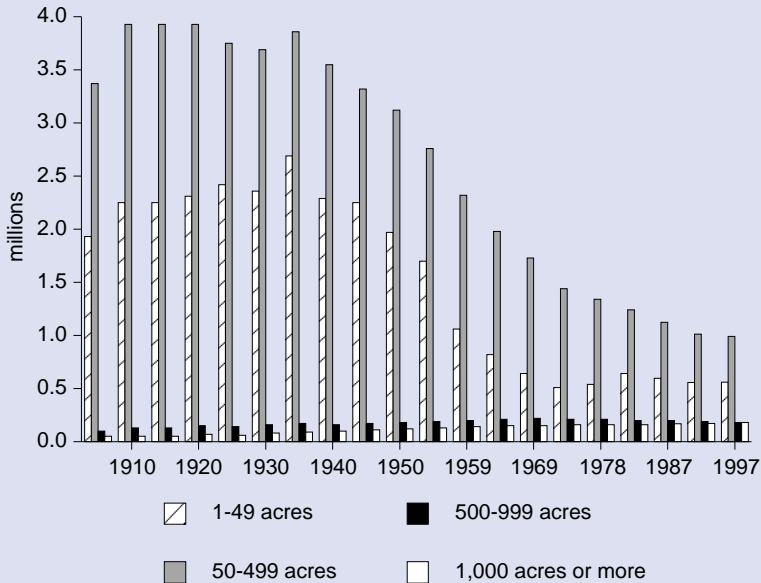
but accounted for nearly 80 percent of all land in farms. In 1997, the average farm size was 471 acres (Figure 7.10).

Total cropland has been rather stable, fluctuating around the 450-million-acre level since 1945 (Figure 7.11). Uses within the cropland base principally fluctuate with changes in cost-price relationships, foreign demand for U.S. grains, natural disasters like severe floods and drought, and farmers' participation in federal acreage adjustment programs, many of which are being phased out by provisions in the 1996 Farm Bill. More cropland was used for crops—cropland harvested, failed, and summer fallow (excludes idle cropland and cropland pasture) in 1997 than during most of the 1980s and early

1990s when more cropland was idled by federal farm programs (Figure 7.12). In 1997, one or more crops were harvested from an estimated 309 million acres of land, the largest area harvested since 1985. The increase resulted from a continued increase in land previously idled by annual federal programs and the longer-term Conservation Reserve Program (CRP) moving back into production and because of a smaller crop failure than in previous years. Due to changes in federal farm programs, no new cropland was idled in annual federal commodity programs in 1996 or in 1997. (Part III, Table 7.4)

The use of reduced tillage and conservation tillage practices has increased in

Figure 7.9 Number of U.S. Farms by Farm Size, 1900-1997



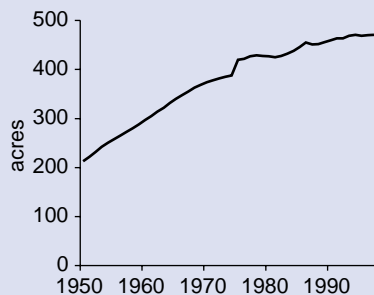
Source: See Part III, Table 7.3.

Note: Data are reported for years coinciding with the Census of Agriculture.

the past decade. (Part III, Table 7.5) Reduced tillage is now used on 77 million acres (26.2 percent of the total). Conservation tillage is used on about 110 million acres, or 37.3 percent of all planted acres. The conservation tillage category is dominated by no-till (46 million acres) and mulch-till (60 million acres) (Figure 7.13). In contrast, conventional tillage is now used on only 36.5 percent of all planted acres, down from nearly 50 percent in 1989. Advantages of reduced tillage and conservation tillage management systems over conventional systems include fuel and labor savings, lower machinery investments, and long-term benefits to soil structure and fertility. These practices provide sufficient residue cover to help protect the soil surface from

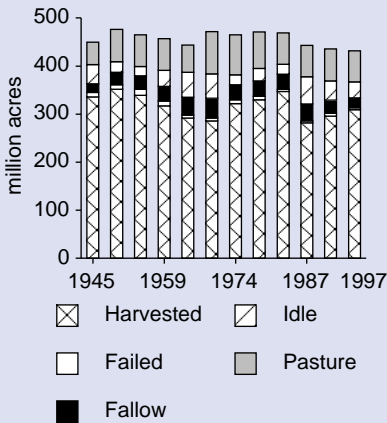
wind and water erosion, slow surface water runoff and enhance infiltration, improve runoff water quality by intercepting nutrients and pesticides, and improve soil productivity.

Figure 7.10 Average U.S. Farm Size, 1950-1997



Source: USDA, National Agricultural Statistics Service, *Farms and Land in Farms* (USDA, NASS, annual).

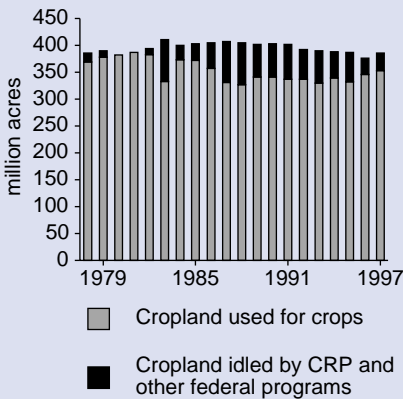
Figure 7.11 Major Uses of U.S. Cropland, 1945-1997



Source: See Part III, Table 7.4.

Notes: Data are reported for years coinciding with the Census of Agriculture. Does not include cropland idled by federal programs.

Figure 7.12 Used and Idled U.S. Cropland, 1978-1997

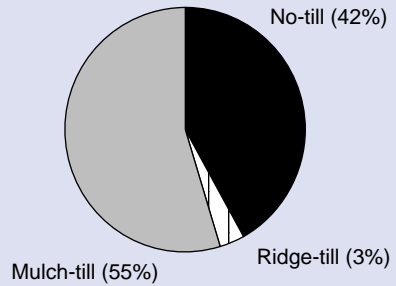


Source: See Part III, Table 7.4.

Note: Does not include cropland pasture or idle land not in federal programs and normally included in the total cropland base shown in Figure 7.11.

Erosion, the wearing away of soil by water, wind, and other forces, occurs naturally on all land. About 40 percent of all

Figure 7.13 U.S. Conservation Tillage by Type, 1997

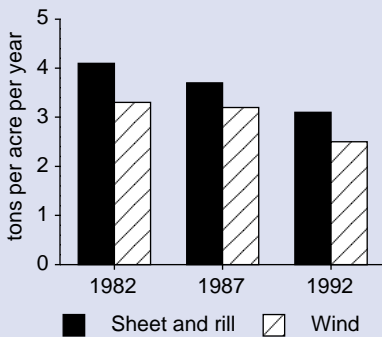


Source: See Part III, Table 7.5.

erosion in the United States results from such activities as construction, logging, and off-road vehicle use, or natural events such as fire, flooding, or drought; the rest comes from cropland and range. Erosion has long been considered a major agent in soil degradation, reduction in soil productivity, and contributor to water and air quality problems (See Chapter 5, Air Quality, for discussion on fugitive dust). Erosion on U.S. cropland has declined sharply in recent years. Over the 1982-92 period, sheet and rill erosion decreased from 4.1 to 3.1 tons per acre per year, while losses from wind erosion declined from 3.3. to 2.5 tons per acre per year (Figure 7.14). (Part III, Table 7.6) Farmers have also reduced erosion on nonfederal pasture and rangeland (Figure 7.15), although the soil savings have not been as great as on cropland.

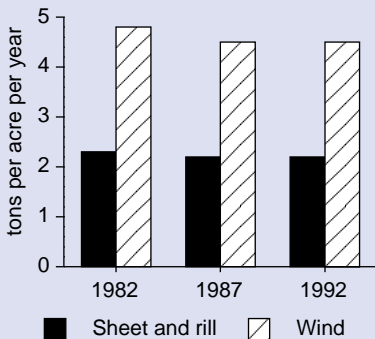
Agriculture has one of the highest rates of productivity growth of all U.S. industries, growing at an average annual rate of 1.94 percent from 1948 to 1996 (Figure 7.16). Sources of these gains were both internal and external to agriculture.

Figure 7.14 Erosion on U.S. Cropland, 1982-1992



Source: See Part III, Table 7.6

Figure 7.15 Erosion on U.S. Pasture and Range, 1982-1992



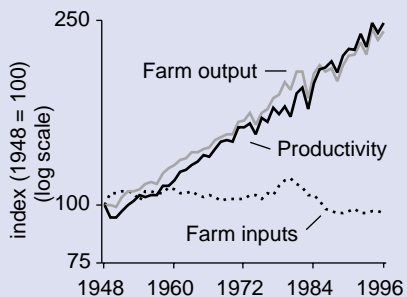
Source: See Source for Part III, Table 7.6.

Weather is a major, unpredictable factor affecting year-to-year variation in productivity, while shocks to the economy indirectly affect relative prices and resource allocations in agriculture. Technological changes after World War II, such as the transition from animal power to tractors, the use of hybrid seeds, improved livestock breeding, and more agricultural chemicals, and the demand for U.S.

exports translated into increased farm output, 1.65 percent annual growth for livestock products and a 2 percent rate for crops. Farmers were able to hold production costs down by substituting capital (primarily durable equipment) and purchased inputs (mainly pesticides, fertilizer, energy, seeds, feed, and livestock) for labor. The fairly stable total input level over 1948-96 disguises shifts in particular inputs, such as the nearly 5 percent per year increase in pesticide use and the average annual drop of 2.7 percent in the labor index. (Part III, Table 7.7)

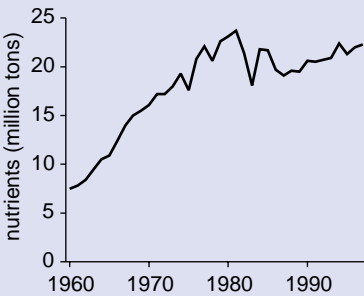
U.S. commercial fertilizer use (nitrogen, phosphate, and potash) for all purposes rose from 7.5 million nutrient tons in 1960 to a record 23.7 million tons in 1981. Total nutrient use dropped from this level to 21.3 million tons in 1995, along with total crop acreage. The numbers have been increasing lately (Figure 7.17), reflecting higher corn acreage, which uses 40 to 45 percent of all fertilizers. Purchased natural processed and dried organic materials historically have represented about 1 percent of total nutrient use. In

Figure 7.16 U.S. Agricultural Productivity, 1948-1996



Source: See Part III, Table 55.

Figure 7.17 U.S. Commercial Fertilizer Use, 1960-1997



Source: See Part III, Table 7.8.

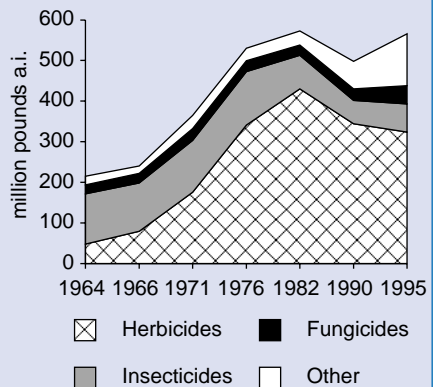
terms of total fertilizer materials (which includes secondary and micro nutrients and filler material), the 1997 total of 55 million tons is the most used in one year over the 1960-97 period. These figures also include fertilizer use on lawns, golf courses, home gardens, and other non-farm lands. (Table Part III, Table 7.8)

Synthetic pesticides were initially developed for commercial use in the late 1940s and 1950s and were widely adopted by the mid-1970s. USDA surveys show that the quantities applied to major field crops, fruits, and vegetables first peaked in 1982, reflecting increased planted acreages, greater proportion of acres treated with pesticides, and higher application rates per treated acre. Between 1982 and 1990, pesticide use declined as commodity prices fell and large amounts of land were taken out of production by federal programs. Since 1990, total quantities of pesticides used on major crops have generally increased (Figure 7.18), but continue to fluctuate with changes in planted acreage, pest and weed infestation levels, adoption of new

products, and other factors. (Part III, Table 7.9)

EPA estimates that between 1975 and 1995 pesticide use declined slightly in all sectors—agriculture, industry and commercial, and home and garden. (Note that data in Tables 7.9 and 7.10 are not directly comparable because of different survey methodologies. In addition, EPA's estimates for agricultural pesticide use cover all agricultural uses and USDA's estimates cover major crop use only.) Over the 1979-95 period, total agricultural pesticide use dropped about 14 percent, from 1,089 to 939 million pounds of active ingredients. Over the same period, pesticide use in the industry and commercial sector dropped by about 40 percent, from 243 to 150 million pounds of active ingredients, while use in homes and gardens decreased by 14 percent, from 155 to 133 million pounds (Figure 7.19). (Part III, Table 7.10)

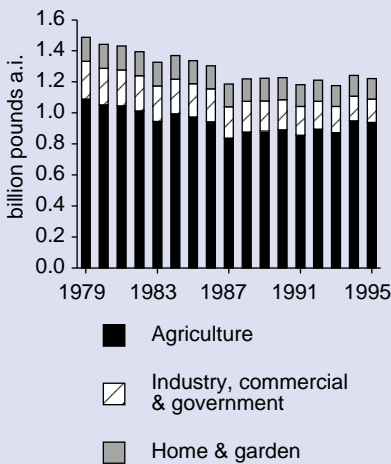
Figure 7.18 U.S. Farm Pesticide Use on Major Crops, 1964-1995



Source: See Part III, Table 7.9.

Note: a.i. = active ingredients.

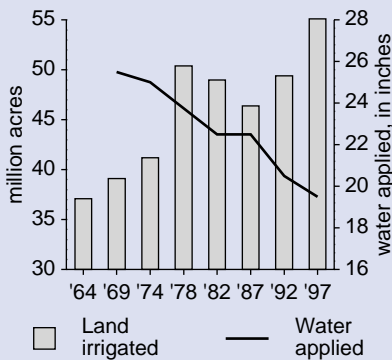
Figure 7.19 U.S. Pesticide Use by Sector, 1979-1995



Source: See Part III, Table 7.10.

Note: a.i. = active ingredients.

Figure 7.20 U.S. Irrigation Trends, 1964-1997



Source: See Part III, Table 7.11.

Note: Water applied = national seasonal average.

1997 estimate reflects 1996 average amount applied.

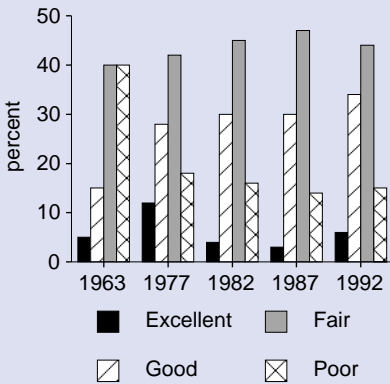
Irrigated farmland is predominantly in the 17 western states. In 1997, 43.0 million acres were irrigated in the West, up slightly from the early 1990s but still less

than the 43.2 million acres that were irrigated in 1978. Irrigated acreage in other states has increased steadily in recent decades, growing from 7.2 million acres in 1978 to 12.1 million acres in 1997. By 1997, the nation had a total of 55.1 million acres of irrigated farmland (Figure 7.20). (Part III, Table 7.11) Changes in irrigated acreage are partially attributable to regional weather patterns, but also to competing urban and environmental demands to reduce irrigated acreage, changes in federal farm programs, and shifts in crop mix on irrigated cropland. Much of the increase in irrigated acreage is due to changes in federal commodity programs that idled irrigated area in the past. Paradoxically, the 25 percent reduction in irrigation water application rates since 1969 has been enough to offset the increase in irrigated acreage and maintain total water applied near the level of 25 years earlier. Application rates vary regionally and in accordance with crop water requirements (e.g., from less than 6 inches for soybeans in Atlantic states to as much as 5 feet for rice in the Southwest).

Rangeland Conditions

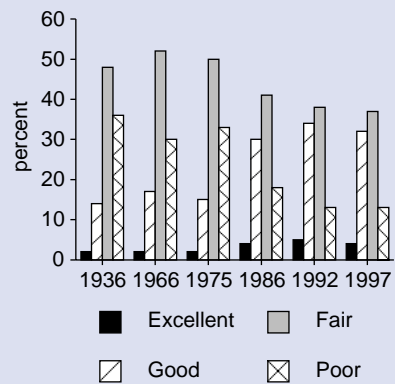
Though still substantially degraded, rangeland on nonfederal and Bureau of Land Management lands is showing signs of improvement. Particularly notable is the decline in the amount of rangeland classified as "poor." On nonfederal land, the percent of rangeland in the poor category dropped from 40 to 15 percent of the total over the 1963-92 period (Figure 7.21); on BLM land, the share dropped from 30 to 13 percent over the 1966-97

Figure 7.21 U.S. Nonfederal Rangeland Condition, 1963-1992



Source: See Part III, Table 7.12.

Figure 7.22 BLM Rangeland Condition, 1936-1997



Source: See Part III, Table 7.12.

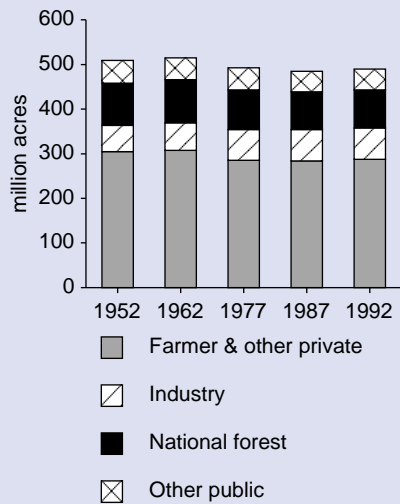
period (Figure 7.22). Still, only 40 percent of nonfederal rangelands and 36 percent of BLM lands are rated in the excellent or good categories. (Part III, Table 7.12)

Since 1952, net timber growth of forests has continually exceeded net timber removals. In 1991, for example, net growth was estimated at 21.6 billion cubic feet,

Forest and Timberland

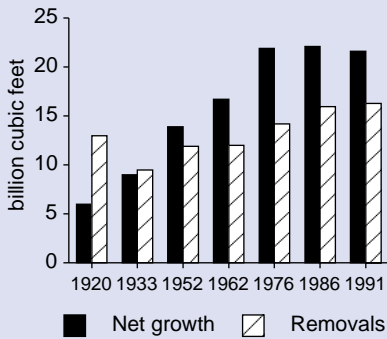
Of the 490 million acres of timberland in the United States, about 14 percent (70 million acres) is owned by the forest industry while about 59 percent (287 million acres) is owned by farmers and other private landholders. About one fourth of the total (131 million acres) is publicly owned, including 17 percent (85 million acres) in the National Forest System. Since 1952, the total area of timberland has decreased 4 percent as a result of withdrawals for wilderness or other land uses that do not permit commercial timber harvest. At the same time, timberland acreage owned by the forest industry has grown, while that of other landowners has declined (Figure 7.23). (Part III, Table 7.13)

Figure 7.23 U.S. Timberland Area by Ownership, 1952-1992



Source: See Part III, Table 7.13.

Figure 7.24 Net Growth and Removals of U.S. Timber, 1920-1991



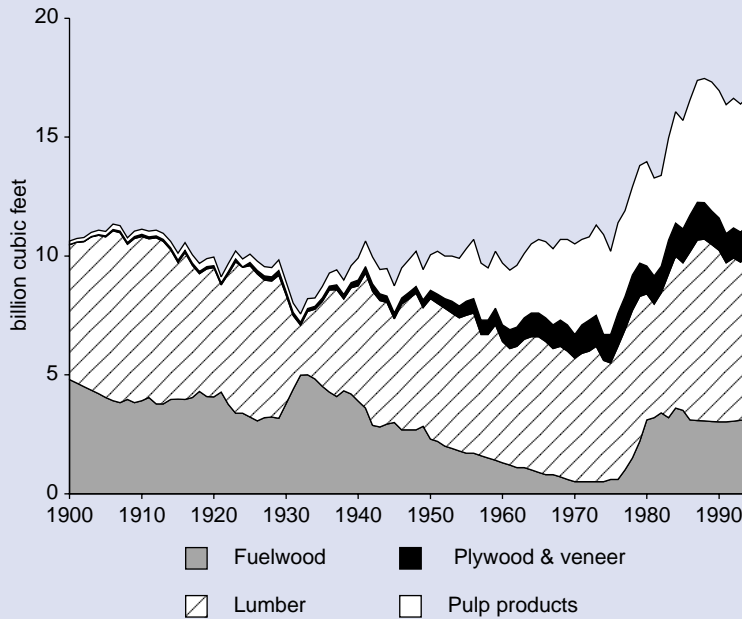
Source: See Part III, Table 7.14.

while net removals were estimated at 16.3 billion cubic feet (Figure 7.24). Almost 55 percent of all timber removals in 1991 came from the forests of the South, which

continued to increase its share of U.S. timber harvest—up from 45 percent in 1970. Softwoods accounted for two-thirds of all growing stock removals in 1991. Timber removals continue to be concentrated on private lands, with nonindustrial private forests contributing 49 percent of all timber removals and industrial forests another 33 percent in 1991.

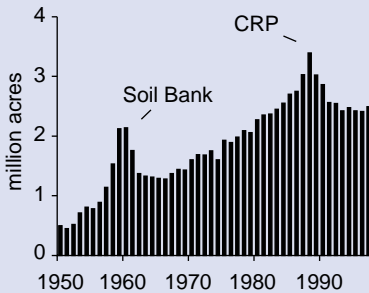
Because growth has exceeded harvest since the 1950s, timber volume of growing stock on timberland has increased since then. All of the increase occurred in hardwoods, which increased from 184 to 335 billion cubic feet over the 1952-92 period. On private lands other than forest industry property, hardwood volume increased from 133 to 242 billion cubic feet. (Part III, Table 7.14)

Figure 7.25 U.S. Production of Forest Products, 1900-1994



Source: See Part III, Table 7.15.

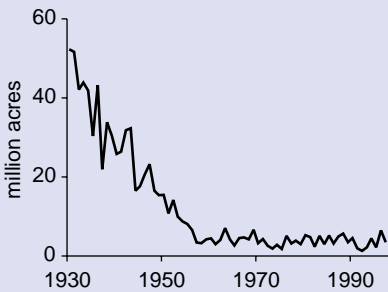
Figure 7.26 U.S. Tree Planting Trends, 1950-1997



Source: See Part III, Table 7.17.

Note: CRP=Conservation Reserve Program.

Figure 7.27 U.S. Forest Land Burned by Wildfire, 1930-1997



Source: See Part III, Table 7.17.

Note: Data are based on the number of acres reported for each year on federal, state, and private lands.

Since 1950, U.S. production of timber products has risen substantially (Figure 7.25), from 10.8 billion cubic feet in 1950 to about 18 billion cubic feet in the 1990s, including large increases in the production of plywood and veneer and pulp products. Over most of this period, lumber production has remained in the range of 5-7.5 billion cubic feet annually. (Part III, Table 7.15) Logging residues have declined, reflecting increased stumpage

prices, improved logging technology, and increased demand for wood products. (Part III, Table 7.16)

Tree planting on all forest ownerships increased dramatically after World War II, peaked in 1988 reflecting increased tree planting on CRP lands, and has remained at about 2-3 million acres annually since then (Figure 7.26). Forest industry, farmers, and other private forest owners account for the largest share of land planted to tree seedlings or direct seeded.

With improved forest fire protection, forest land burned by destructive wildfires has decreased by 90 percent since 1930—from 50 million acres per year to 2 to 7 million acres per year (Figure 7.27). (Part III, Table 7.17)

The Southern pine beetle has caused by far the most insect damage to U.S. forestlands in the 1990s. In 1997, the Southern pine beetle damaged 8.5 million acres of forestland. Damage from the Spruce budworm, Western spruce budworm, Gypsy moth, and Mountain pine beetle has been generally minor since 1993. (Part III, Table 7.18)

ONLINE RESOURCES

The Agriculture Department has four agencies—the Economic Research Service (ERS), National Agricultural Statistical Service (NASS), Natural Resources Conservation Service (NRCS), and Forest Service—that provide valuable online material about terrestrial resources.

ERS (<http://www.econ.ag.gov>) provides useful material on land use and other subjects. ERS publications

(<http://www.econ.ag.gov/Prodsrvs/reports.htm>) includes a Land, Water, and Conservation category (<http://www.econ.ag.gov/Prodsrvs/rept-lwc.htm>). Within that category are publications on wetlands and agriculture, soil erosion and conservation, and several studies on the Conservation Reserve Program. ERS also provides the series entitled *Major Uses of Land in the United States*; the latest report summarizes land use in the United States in 1992. Summaries of this and many other reports are available online (<http://www.econ.ag.gov/epubs/htmlsum/index.htm#summaries>).

ERS also publishes *Agricultural Resources and Environmental Indicators*, which includes data on how natural resources (land and water) and commercial inputs (energy, nutrients, pesticides, and machinery) are used in the agricultural sector (<http://www.econ.ag.gov/epubs/pdf/ah712>). This report can be downloaded either in parts or in its entirety.

NASS (<http://www.usda.gov/nass/>) conducts hundreds of surveys and prepares reports covering virtually every facet of U.S. agriculture—production and supplies of food and fiber, prices paid and received by farmers, farm labor and wages, and farm aspects of the industry. NASS publications cover a wide range of subjects, from traditional crops, such as corn and wheat, to specialties, such as mushrooms and flowers; from calves born to hogs slaughtered; from agricultural prices to land in farms (<http://www.usda.gov/nass/pubs/pubs.htm>). NASS conducted the 1997 Census of Agriculture, which is a complete accounting of United States

agricultural production (in prior years, the agricultural census was conducted by the Bureau of the Census). Early reports from the 1997 census are available (<http://www.nass.usda.gov/census/>).

NRCS information is accessible (<http://www.nrcs.usda.gov>). The NRCS “Technical Resources” site (<http://www.nrcs.usda.gov/TechRes.html>) includes links to databases on soil, water, and climate; the National Resources Inventory; the National PLANTS database; and water and climate data. The 1992 National Resources Inventory is a statistically based sample of land use and natural resource conditions on America’s 1.5 billion acres of nonfederal land. Information is available for three years—1982, 1987, and 1992.

At the Forest Service homepage (<http://www.fs.fed.us>), the “Topics” section (<http://www.fs.fed.us/links/topics.shtml>) includes categories such as fire, forest health, and forest management. The forest management category (<http://www.fs.fed.us/land/fm>) includes material on reforestation and timber stand improvement, old growth forest vegetation, national forest timber harvest, quarterly harvest reports, and timber sale data by region, forest, and state. The fire category (<http://www.fs.fed.us/land/wdfire.htm>) includes material on federal wildland fire policy, the role of wildland fire in resource management, and the use of wildland fire.

The Forest Service has a framework for reporting forest health conditions across the United States (<http://www.fs.fed.us/foresthealth/>). Reports cover forest health on all ownerships and involve col-

laboration between state and federal agencies. The Forest Service prepares national reports on American forests and also provides regional reports. *America's Forests: 1997 Health Update* (http://www.fs.fed.us/foresthealth/fh_update/update97/index.html) includes a useful summary of forest ecosystem health issues in America's forests.

The Forest Inventory and Analysis section (<http://www.srsfia.usfa.msstate.edu/>) provides links to regional offices, data retrieval, and information on the 1993 Resource Planning Act (RPA) Assessment. The Timber Production Output (TPO) database retrieval system consists of 11 data variables that describe for each county the roundwood products harvested, the logging residues left behind, the timber otherwise removed, and the wood and bark residues generated by its primary wood-using mills.

The Environmental Protection Agency's Office of Pesticide Programs homepage (<http://www.epa.gov/pesticides>) provides voluminous information on pesticide health and safety risks. Under Information Resources (<http://www.epa.gov/pesticides/info.htm>), the office provides access to many other valuable online sites on pesticides. For example, the National Pesticide Information Retrieval System (<http://ceris.purdue.edu/npirs/npirs.html>) is a set of pesticide-related databases maintained by the Center for Environmental and Regulatory Information Systems at Purdue University. The National Pesticide Telecommunications Network (<http://ace.orst.edu/info/nptn>), a cooperative effort of EPA and Oregon State University, provides information about a vari-

ety of pesticide-related subjects. Information on pesticide industry sales and usage also is available at <http://www.epa.gov/opplead1/95pestsales/index.html>.

The American Forest and Paper Association is the national trade association of the forest, paper, and wood products industry (<http://www.afandpa.org/index.html>). The site includes information on the industry's sustainable forestry initiative and its principles for sustainable forestry. IRIS (<http://primusweb.com/forest>) is a network providing links and information on forest products generally. Their category on associations and organizations provides a long list of associations in the U.S. and elsewhere with an interest in forest products.

Information on sustainable forest practices is available at many sites. The Forest Stewardship Council of the United States (<http://www.fscus.org/fscus1b.html>) works on sustainable forestry and forest certification. This site also provides a link to the Forest Stewardship Council International. In Canada, see the Canadian Sustainable Forestry Certification Coalition (<http://www.sfms.com>).

Among NGOs, Resources for the Future is active on forest issues (http://www.rff.org/nat_resources/forests.htm). RFF has recently completed studies on timber supply modeling for the 21st Century and on the impacts of climate change on global timber markets.

The Lincoln Institute of Land Policy (<http://www.lincolninst.edu>) publishes a variety of studies on land use and regulation, property rights, and land taxation. Recent reports include studies

on open space conservation and on alternatives to sprawl.

Other NGOs with an interest in forest issues include the American Forest Foundation (<http://www.affoundation.org>), American Forests (<http://www.amfor.org>), American Rivers (<http://www.amrivers.org>), National Association of State Foresters (<http://www.stateforesters.org>), National Audubon Society (<http://www.audubon.org>), National Forest Foundation (<http://www.nffweb.org>), Defenders of Wildlife (<http://www.defenders.org>),

Ducks Unlimited (<http://www.ducks.org>), Friends of the Earth (<http://www.foe.org>), Natural Resources Defense Council (<http://www.nrdc.org>), Public Lands Foundation (<http://www.publicland.org>), Society of American Foresters (<http://www.safnet.org>), Trust for Public Land (<http://www.igc.org/tpl>), The Wilderness Society (<http://www.wilderness.org>), The Nature Conservancy (<http://www.tnc.org>), and the Sierra Club (<http://www.sierraclub.org>).

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